National Institute of Environmental Health Sciences

Phase change material applications in buildings: An environmental assessment for some Spanish climate severities

Author(s): Aranda-Uson A, Ferreira G, Lopez-Sabiron AM, Mainar-Toledo MD, Zabalza Bribian I

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Abstract:

This work proposes an environmental analysis based on the life cycle assessment (LCA) methodology. LCA was applied to determine if energy savings are large enough to balance the environmental impact caused during phase change material (PCM) manufacture and its installation on tiles. Inputs and outputs of each management stage have been defined and the inventory emissions were calculated by SIMAPRO v 7.3.2. Emissions were classified into several impact categories; climate change, human toxicity, acidification, ozone depletion, particulate matter formation and eutrophication. Three commercial PCMs, evaluated using five different Spanish weather climates, were studied to explore a wide range of conditions. The main results conclude that the use of PCM can reduce the overall energy consumption and the environmental impacts. This reduction is strongly influenced by the climate conditions and the PCM introduced.

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Resource Description

Exposure : ☑

weather or climate related pathway by which climate change affects health

Solar Radiation, Temperature

Temperature: Extreme Cold, Extreme Heat, Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Spain

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Mitigation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified